Write up for Programming Assignment 1

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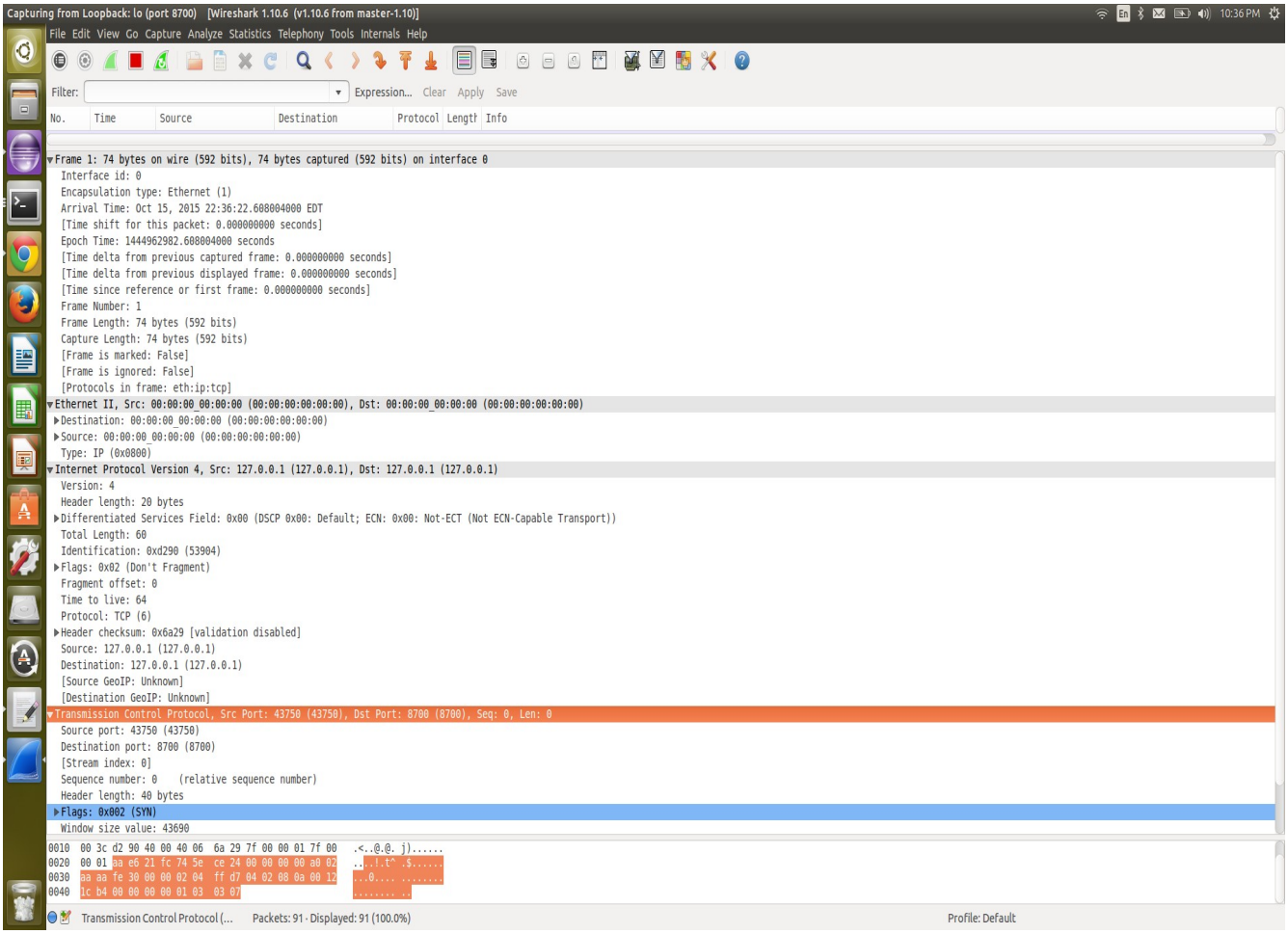
TCP Client RTT statistics for requesting and receiving one to ten 1 MB files for persistent and non persistent connection(both on the same machine).

File size	Persistent client (in microseconds)	Non-persistent client (in microseconds)
1 MB	2269	5169
2 MB	2686	
3 MB	5679	
4 MB	7555	
5 MB	10070	
6 MB	15644	
7 MB	16930	
8 MB	19819	
9 MB	20096	
10 MB	21487	

As seen from the above table the time increases linearly as the file size increases.

Wireshark screenshot for packets transfer between TCP client and server:



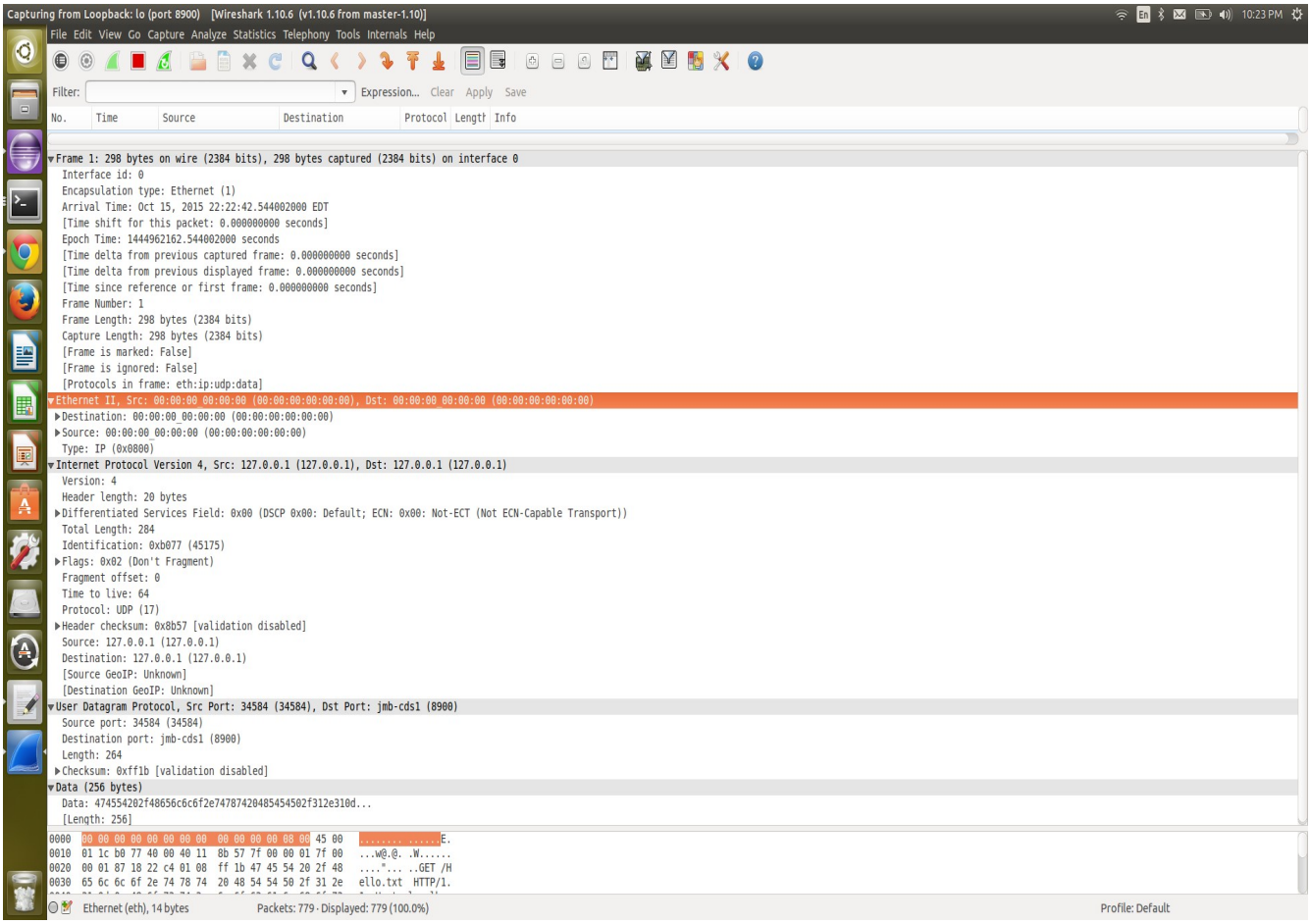
UDP client server RTT statistics with both running on the same server:

UDP sends the packet without establishing connection between the sockets and also sends datagrams of size less than or equal to MSS.

File size	Time taken in microseconds
1 MB	78502

Attached below the wireshark screenshot to show packet transfer between UDP server and client:

I did not notice any packet loss in the transfer of 1 MB file as the network was high speed and both server and client were on the same machine.



Multi-threaded TCP server and client analysis with three persistent clients and 10 1 MB files requested per client:

File size	Persistent client 1 (microseconds)	Persistent client 2 (microseconds)	Persistent client 3 (microseconds)
1 MB	1901	1436	1407
2 MB	1480	1879	3293
3 MB	1576	1454	1295
4 MB	1403	1277	1473
5 MB	1480	1483	3015
6 MB	1496	1289	3454
7 MB	1797	1378	1473

8 MB	3633	1412	1370
9 MB	3143	1339	1455
10 MB	3167	2091	1615

Multi-threaded TCP server and client analysis with three non-persistent clients and one 1- MB file requested per client:

File size	Non persistent client 1(microseconds)	Non persistent client 2(microseconds)	Non persistent client 3(microseconds)
1 MB	1000	1361	2126

Analysis:

1. In UDP sever client I did not experience packet loss because of the high speed network.
2. In case of TCP server client, the time taken for bigger files increases linearly as the file size grows.
3. TCP is a reliable and connection-oriented protocol so no packet loss occurs.
4. Multi-threaded TCP server can serve multiple clients with each on a separate thread and no packet loss occurs.